U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: Elimia melanoides

COMMON NAME: black mudalia

LEAD REGION: 4

INFORMATION CURRENT AS OF: March 2006

STATUS/ACTION

___ Species assessment - determined we do not have sufficient information on file to support a proposal to list the species and, therefore, it was not elevated to Candidate status
_X_ New candidate
___ Continuing candidate
___ Non-petitioned
___ Petitioned - Date petition received:
__ 90-day positive - FR date:
__ 12-month warranted but precluded - FR date:
__ Did the petition request a reclassification of a listed species?

FOR PETITIONED CANDIDATE SPECIES:
a. Is listing warranted (if yes, see summary of threats below)?
b. To date, has publication of a proposal to list been precluded by other higher priority listing actions?
c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded.

___ Listing priority change
Former LP: ___
New LP: ___
Date when the species first became a Candidate (as currently defined):
___ Candidate removal: Former LPN: ___
___ A – Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.
____U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.
___ F – Range is no longer a U.S. territory.
___ I – Insufficient information exists on biological vulnerability and threats to support listing.

___ M – Taxon mistakenly included in past notice of review.
___ N – Taxon does not meet the Act's definition of "species."
___ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Snails - Pleuroceridae

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Alabama

CURRENT STATES/COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Blount County, Alabama

LAND OWNERSHIP
Rivers and streams where this species occurs are under State jurisdiction. Riparian lands are in private ownership.

LEAD REGION CONTACT: Rick Gooch 404/679-7124, Richard_gooch@fws.gov

LEAD FIELD OFFICE CONTACT: Jackson, Mississippi Field Office, Paul Hartfield, 601/321-1125, paul_hartfield@fws.gov

BIOLOGICAL INFORMATION

Species Description
The black mudalia is a small species of aquatic snail growing to 13 millimeters (mm) (0.5 inches) in length. The shell is thin, ovately conic in shape, smooth, and the top of the shell is usually eroded. The aperture (shell opening) is oval, and about one-half the length of the shell. The columella (area of thick shell between the body of the shell and the aperture) is smooth, white, and tinged with violet, pink, or red. Shell color is green to brown, occasionally with brown transverse color bands. In the wild, however, the shell is almost always covered with black mineral deposits. The operculum (hard structure that covers the aperture when the snail body is drawn into the shell) is thin, dark, oval, and impressed at occasional growth lines (Goodrich 1941, Minton et al. 2003).

Taxonomy
The black mudalia belongs to the aquatic snail family of Pleuroceridae. The species was described from "rivers in North Alabama" by T.A. Conrad in 1834 as Anculosa melanoides. Subsequently, it was established that the oldest available name for this genus was Leptoxis Rafinesque, 1819, and not Anculosa Say, 1821 (Stein 1976). Early treatments of Anculosa melanoides (e.g., Goodrich 1941) recognized that certain characters of the radulae (ribbon-like organ used in rasping food) and operculum suggested a closer affinity with the pleurocerid genus Elimia. Recent genetic and morphological studies have confirmed this affinity, and the species was recently redescribed as Elimia melanoides (Minton et al. 2003). This peer-reviewed publication (Minton et al. 2003) supports recognition of the black mudalia as a valid taxon that meets the Endangered Species Act definition of a species.

Habitat/Life History

The black mudalia is found clinging to clean gravel, cobble, boulders and/or logs in flowing water on shoals and riffles. Little is known of its life history, however pleurocerid snails may live as long as 5 years (Dillon 1988), and generally feed by ingesting periphyton (algae attached to hard surfaces) and biofilm detritus scraped off of the substrate by the snail's radula (Morales and Ward 2000).

Historical Range/Distribution

The historical distribution of the black mudalia included much of the upper half of the Black Warrior River drainage in Alabama. Museum records for black mudalia are known from the Black Warrior River from Tuscaloosa to the confluence of the Locust and Mulberry Forks (Tuscaloosa/Jefferson Counties); the Locust Fork to approximately US 278 (Jefferson/Blount Counties); the Mulberry Fork to the confluence of Sipsey Fork (Walker County); Sipsey Fork to FSR 234 (Walker/Winston Counties); and from Valley Creek, Little Warrior River, and Blackburn Fork of the Little Warrior (Jefferson/Blount Counties) (FSMNH). This encompasses over 250 miles of river and stream channel.

Current Range/Distribution

The black mudalia is currently known from five localized shoals in an approximately 30 mile reach of the upper Locust Fork of the Black Warrior River, and from two shoals in a one mile reach of the Little Warrior River, a tributary of the Locust Fork. Each shoal encompases at least several hundred meters of river channel (P. Hartfield, U.S. Fish and Wildlife Service, pers. obsv. 2006). All currently known populations are in Blount County, Alabama (Minton et al. 2003). There are 1985 and 1990 museum records of black mudalia from the Sipsey Fork, Bankhead National Forest, Winston County (FSMNH), and Forest Service biologists collected a single animal from the same area in 1993 (Wendell Haag, U.S. Forest Service, pers. comm. 2006). However, the species has not been recently found in the Sipsey Fork.

Population Estimates/Status

Early in the 20th century, Goodrich (1922) noted that the black mudalia was "...perhaps a vanishing race..." based on its narrow range and low numbers. By 1976, the species was considered possibly extinct (Stein 1976). Survey efforts in the early 1990's (Service field records, 1990-95; M. Pierson, Calera, Alabama, field records, 1993) failed to locate or to recognize and appropriately identify the species. Given that the black mudalia had not been documented in over 50 years, Bogan et al. (1995) listed it as presumed extinct, a status adopted by Turgeon et al. (1998). In 1996, a snail survey of 57 sites in the Locust Fork drainage of the Black Warrior River located the black mudalia at seven sites in Blount County, Alabama (Minton et al. 2003). Population estimates are not available, however, at one shoal on the Little Warrior River they are estimated to number in "the thousands" (P. Johnson, Tennessee Aquarium Research Institute, pers. comm. 2003). The State of Alabama considers the black mudalia as a Priority 2 species of high conservation concern (Mirarchi et al. 2004, Alabama Department of Conservation and Natural Resources (ADCNR) 2005). The NatureServe global ranking is G2, imperiled (www.natureserve.org).

THREATS

A. The present or threatened destruction, modification, or curtailment of its habitat or range.

The historical habitat of the black mudalia included shoals and riffles throughout much of the upper Black Warrior River drainage above the Fall Line at Tuscaloosa, Alabama. The species has been extirpated from more than 80 percent of that range. The black mudalia requires flowing water, and the construction of two major dams on the main stem Black Warrior River above the Fall Line (Oliver Lock and Dam, 1940; Holt Dam, 1966) and another dam on the lower Sipsey Fork (Bankhead Dam, 1975), destroyed or severely modified over 150 miles of stream and river habitat within the historical range of black mudalia.

Other historical causes of range curtailment in the remaining unimpounded river and stream channels of the upper Black Warrior drainage included coal mine drainage, industrial and municipal pollution events, and agricultural runoff (e.g., Shepard et al. 2004). The Black Warrior River drains the southernmost largest coalfield in North America (Mettee et al. 1989). During the early 1800's, coal was mined directly from some stream channels in the drainage. Later in the 19th century, most coal was obtained through strip mining, and coal washing effluent was directly discharged into surface waters. Prior to 1969, there were no laws or regulations governing strip mining in Alabama (Dodd et al. 1986), and by the late 1960's, the cumulative impacts of mining and industrial wastes had eliminated all signs of plant and animal life in some portions of the Locust Fork drainage (Barcly 1973 as cited in Shepard et al. 2001).

The black mudalia is currently known from five localized shoals on a short reach of the Locust Fork of the Black Warrior River, and two adjacent shoals on a tributary, Little Warrior River, Blount County, Alabama. The species may also survive in low numbers in a small portion of the Sipsey Fork, Winston Count, Alabama. The primary threat to the localized black mudalia snail populations in these areas is habitat modification or destruction related to water quality Point source discharges and land surface runoff (nonpoint pollution) can cause nutrification, decreased dissolved oxygen concentration, increased acidity and conductivity, and other changes in water chemistry that are likely to seriously impact aquatic snails.

Nonpoint source pollution from land surface runoff can originate from virtually all land use activities, and include sediments, fertilizers, herbicides, pesticides, animal wastes, septic tank and gray water leakage, and oils and greases (Alabama Department of Environmental Management (ADEM) 1996). Land uses in the vicinity of black mudalia populations include pasture, row crops, timber production, and chicken farms. Most pollutants in surface and groundwater within the upper Black Warrior Basin have originated from agricultural activities, abandoned mine runoff, construction, silviculture, failing septic tanks and contaminated runoff from urban areas (Upper BlackWarrior Technical Task Force 1991, Shepard et al. 2001).

Excessive sediments can impact riverine snails requiring clean, hard shoal stream and

river bottoms, by making the habitat unsuitable for feeding or reproduction. Similar impacts resulting from sediments have been noted for many other components of aquatic communities. For example, sediments have been shown to abrade and/or suffocate periphyton (organisms attached to underwater surfaces, upon which pleurocerid snails feed); affect respiration, growth, reproductive success, and behavior of aquatic insects and mussels; and affect fish growth, survival, and reproduction (Waters 1995). Potential sediment sources within a watershed include virtually all activities that disturb the land surface, and all localities currently occupied by these snails are affected to varying degrees by sedimentation (Shepard et al. 2001).

Land surface runoff also contributes human-induced nutrients to streams and rivers. Excessive nutrient input (from fertilizers, sewage waste, animal manure, etc.) can result in periodic low dissolved oxygen levels that are detrimental to aquatic species, including pleurocerid snails (Hynes 1970). Nutrients also promote heavy algal growth that may cover and eliminate clean rock or gravel habitats of shoal dwelling snails. Nutrient and sediment pollution may have synergistic effects (a condition in which the toxic effect of two or more pollutants is much greater than the sum of the effects of the pollutants when operating individually) on freshwater snails and their habitats, as has been suggested for aquatic insects (Waters 1995). A recent water quality study identified the Locust Fork reach occupied by the snails as eutrophic due to excess nutrients and high quantities of algae (O'Neil and Shepard 2001).

Studies of habitat quality in the Locust Fork (Shepard et al. 2004) have found habitat conditions generally "good" within the reach currently occupied by the black mudalia, but conditions deteriorated at sample stations above the occupied reach. Fine sediments were identified as the primary potential threat to habitat conditions.

Habitat quality was reported as "excellent" in the vicinity of the two shoal populations of black mudalia in the Blackburn Fork of the Little Warrior River, however habitat was rated as poor at stations in the Calvert Prong of the Little Warrior River.

B. Overutilization for commercial, recreational, scientific, or educational purposes.
The black mudalia has no commercial value, and overutilization has not been a problem.

C. Disease or predation.
Disease is not currently known to be a factor in the decline of the black mudalia. Aquatic snails are consumed by various vertebrate predators, including fishes, mammals, and possibly birds. Predation by naturally occurring predators is a normal aspect of the population dynamics of a species and is not considered a threat to the black mudalia. However, the potential now exists for the black carp (Mylopharyngodon piceus), a mollusk-eating Asian fish recently introduced into the waters of the United States, to eventually enter the Mobile River Basin.

D. The inadequacy of existing regulatory mechanisms.
There is currently no information on the sensitivity of the black mudalia to common industrial or municipal pollutants. Existing State and Federal regulations regarding such

discharges are assumed to be protective; however, the species has disappeared from large portions of range that have been affected by historical pollution events. Black mudalia may also be more susceptible to some pollutants than test organisms currently used in bioassays. A lack of adequate research and data may prevent existing authorities, such as the Clean Water Act, administered by the Environmental Protection Agency and the Army Corps of Engineers, from being fully utilized.

Stream segments within the drainage currently occupied by the black mudalia have been assigned water-use classifications of "fish and wildlife" (F&W) by ADEM. The F&W designation establishes minimum water quality standards that are believed to protect existing species and their uses within the designated area, and most of the stream segments draining into black mudalia habitat currently support their F&W classification standards. However, about 75 miles of the Locust Fork have been identified on the Draft 2006 303(d) List (a list of water bodies failing to meet their designated water-use classifications) as impaired by siltation, nutrients, and/or other habitat alterations (ADEM 2006).

ADEM maintains water-use classifications through issuance of National Pollutant Discharge Elimination System (NPDES) permits to industries, municipalities and others that set maximum limits on certain pollutants or pollutant parameters. There are at least eight permitted point source discharges that drain into the current range of the black mudalia, including four municipal, one industrial, two schools, and one private business (O'Neil and Shepard 2001).

The black mudalia has been identified by the Alabama Department of Conservation and Natural Resources (ADCNR) as a "Priority 2" species of high conservation concern due to its rarity and restricted distribution (Mirarchi et al. 2004, ADCNR 2005). NatureServe identifies the black mudalia as a G2 imperiled species. These classifications, however, offer no legal protection. Lacking State or Federal protection, the black mudalia is not currently given any special consideration under other environmental laws when project impacts are reviewed.

E. Other natural or manmade factors affecting its continued existence.
Limited distribution and the nature of its habitat (i.e., small to moderate sized streams) make the black mudalia highly vulnerable to random natural or manmade catastrophic events such as droughts, floods or chemical spills. The black mudalia population in the Sipsey Fork is apparently very small, and inbreeding may become a factor in conservation of that population. Genetic flow between the Sipsey Fork and Locust Fork populations is prevented by a major dam and more than 50 miles of impounded channel. Although genetics of the species is poorly known, inbreeding and reduced genetic diversity may become a threat if population declines continue (Avise and Hambrick 1996).

CONSERVATION MEASURES PLANNED OR IMPLEMENTED
The State of Alabama has established a propagation facility for imperiled mussels and snails, and has worked with the Service to prepare and implement a Plan for Controlled

Propagation, Augmentation, and Reintroduction for freshwater mollusks of the Mobile Basin (U.S. Fish and Wildlife Service 2003). Life history and propagation studies are planned. ADCNR has identified the need to conduct a a comprehensive inventory of black mudalia, evaluate population viability and identify potential reintroduction sites (ADCNR 2005).

SUMMARY OF THREATS: Black mudalia has experienced significant curtailment of range and habitat. After being considered extinct for two decades, the black mudalia was rediscovered in a small portion of its' historical range in the Black Warrior drainage, Alabama. Impounded waters from dams has destroyed much of its' habitat and fragmented its' range. Populations that may have avoided impoundment apparently disappeared due to historical pollution events and/or natural catastrophic events. Today, only eight localized populations are known. Because of their limited range and localized distributions, the surviving shoal populations of black mudalia are vulnerable to gradual degradation and loss of habitat through nonpoint source pollution, and to natural or human induced catastrophic events affecting its stream and river habitats (e.g., toxic spills, droughts, etc.).

RECOMMENDED CONSERVATION MEASURES
A captive population should be established for study and to produce propagules for reintroduction. Life history and toxicity studies should be conducted. Potential reintroduction sites need to be identified. The surviving populations and reintroduced populations should be routinely monitored for population trends (ADCNR 2005).

LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	**Imminent**	Monotypic genus	1
		Species	**2***
		Subspecies/population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:

Magnitude: Only eight localized populations are known to survive, and all are currently affected by point and/or nonpoint source pollution. Three are minimally impacted, but the other five are highly affected by water and habitat quality deterioration due primarily to nonpoint source pollution.

Imminence: Nonpoint source threats posed by water and habitat quality degradation are currently affecting all populations. Human land uses, including cattle grazing, row crops, timber, chicken farms, and home construction are currently causing sedimentation and eutrophication of black mudalia habitats.

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted? No, at this time, we do not believe that the current immediacy or magnitude of identified threats to the species warrant the need for emergency listing as outlined in section 4 of the Endangered Species Act. The Service will continue to monitor and assess the status and trends of the species and may adjust this conclusion using the best scientific and commercial information as it becomes available.

DESCRIPTION OF MONITORING:
Species experts and appropriate individuals with State and Federal agencies have been contacted and asked to provide data on the black mudalia. These include Stan Cook, Dr. Paul Johnson, and Jeff Garner, ADCNR; and Jeff Powell, USFWS. Black mudalia were last monitored in 2003 (P. Johnson, pers. comm., 2003).

COORDINATION WITH STATES
Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment: Alabama reviewed this species assessment and provided editorial comments.

LITERATURE CITED

Peer-reviewed original research based on data:

Bogan, A.E., J.M. Pierson, and P. Hartfield. 1995. Decline in the freshwater gastropod fauna in the Mobile Bay Basin. In: E.T. LaRoe, G.S. Farris, C.E. Puckett, P.D. Doran, M.J. Mac, Eds. Our living Resources, a report to the Nation on the distribution, abundance and health of U.S. plants, animals and ecosystems. U.S. Department of Interior, National Biological Survey, Washington, D.C. pp. 249-252.

Dillon, R.T., Jr. 1988. Evolution from transplants between genetically distinct populations of freshwater snails. Genetica 76:111-119.

Goodrich, C. 1922. The Anculosae of the Alabama River Drainage. Miscellaneous Publications, Museum of Zoology, University of Michigan (7):1-57.

Goodrich, C. 1941. Pleuroceridae of the small streams of the Alabama River system. Occasional Papers of the Museum of Zoology, University of Michigan (427):1-10.

Mettee, M.F., P.E. O'Neill, J.M. Pierson, and R.D. Suttkus. 1989. Fishes of the Black Warrior River system in Alabama. Geological Survey of Alabama Bulletin 133. 201 pp.

Minton, R.L., J. T. Garner, and C. Lydeard. 2003. Rediscovery, systematic position, and redescription of "Leptoxis" melanoides (Conrad, 1834) (Mollusca: Gastropoda: Cerithioidea: Pleuroceridae) from the Black Warrior River, Alabama, U.S.A. Proceedings of the Biological Society of Washington 116(3):531-541.

Morales, J.B.T., and A.K. Ward. 2000. Differential incorporation of algae and bacteria by Elimia clara (Prosobanchia:Pleuroceridae) - a study using dual-labeled epilithon. Journal of the North American Benthological Society 19(2): 289-297.

Peer reviewed secondary research derived:

Avise, J.C. and J.L. Hambrick, eds. 1996. Conservation genetics: case histories from nature. Chapman and Hall, New York.

Hynes, H.B.N. 1970. The Ecology of Running Waters. University of Toronto Press, Toronto.

Mirarchi, R.E., J.T. Garner, M.F. Mettee, P.E. O'Neil, eds. 2004. Alabama wildlife. Volume 2. Imperiled aquatic mollusks and fishes. The University of Alabama Press, Tuscaloosa, AL. 255 pp.

Stein, C.B. 1976. Gastropods. Pp. 21-41. In: H. Boschung, (Ed.) Endangered and threatened species of Alabama. Bulletin Alabama Museum of Natural History, No. 2.

Turgeon, D. D., J. F. Quinn Jr., A. E. Bogan, E. V. Coan, F. G. Hochberg, W. G. Lyons, P. M. Mikkelsen, R. J. Neves, C. F. E. Roper, G. Rosenberg, B. Roth, A. Schletema, F. G. Thompson, M. Vecchione, & G. D. Williams. 1998. Common and scientific names of aquatic invertebrates from the United States and Canada: Mollusks (2nd edition). American Fisheries Society Special Publication 26. 526 pp.

Waters, Thomas F. 1995. Sediment in streams: sources, biological effects and control. American Fisheries Society Monograph 7.

Grey research based on data:

Alabama Department of Environmental Management (ADEM). 1996. Water quality report to Congress for calender years 1994 and 1995. Montgomery, Alabama. 144 pp.

ADEM. 2006. Draft 2006 Section 303(d) List. Montgomery, Alabama. Pp. 1-2.

Alabama Department of Conservation and Natural Resources. 2005. Alabama's comprehensive wildlife conservation strategy. Montgomery, Alabama.

Dodd, C.K., K.M. Enge, and J.N. Stuart. 1986. The effects of mining siltation on the distribution and abundance of the flattened musk turtle, Sternotherus depressus, in northern Alabama. Denver Wildlife Research Center, Gainevsille, FL 82 pp.

O'Neil, P.E., and T.E. Shepard. 2001. Water-quality assessment of the Locust Fork watershed, Alabama. Geological Survey of Alabama. 33 pp.

Shepard, T.E., P.E. O'Neil, S.W. McGregor, and M.F. Mettee. 2004. Biomonitoring in the Locust Fork watershed, 1997-98. Geological Survey of Alabama Bulletin 175. 61 pp.

Grey literature based on literature analysis:

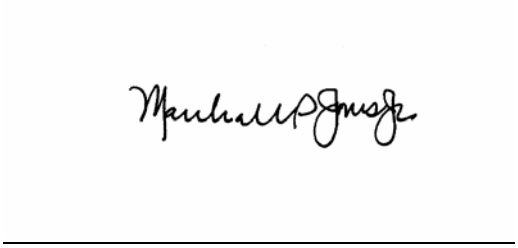
Upper BlackWarrior Technical Task Force. 1991. Upper Black Warrior water quality improvement plan. USDA Soil Conservation Service. 34 pp.

U.S. Fish and Wildlife Service. 2003. Plan for controlled propagation, augmentation, and reintroduction for freshwater mollusks of the Mobile Basin. Ecological Services, Jackson, MS.

Other:

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve: /s/ Jeffrey M. Fleming 3/6/2006
Acting Regional Director, Fish and Wildlife Service Date



Concur: _____ August 23, 2006
Acting Director, Fish and Wildlife Service Date

Do Not Concur: _____ _____
Director, Fish and Wildlife Service Date

Date of annual review: March 2006

Conducted by: Jackson, Mississippi Field Office